

AF/3723

PATENT
Attorney Docket No. 99154
LVM Reference No. 204201

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of:

Fang et al.

Art Unit: 3723

Application No. 09/595,227

Examiner: Hadi Shakeri

Filed: June 16, 2000

For: METHOD FOR POLISHING A MEMORY
OR RIGID DISK WITH A PHOSPHATE
ION-CONTAINING POLISHING
SYSTEM

APPELLANTS' SUPPLEMENTAL REPLY BRIEF

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Commissioner for Patents
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Dear Sir:

Appellants hereby file a supplemental reply brief to the Supplemental Examiner's Answer. The Supplemental Examiner's Answer was mailed by the U.S. Patent and Trademark Office on July 15, 2004, thereby making any supplemental reply brief due September 15, 2004. This supplemental reply brief is provided in further support of the appeal of the decision of the final rejection of claims 1-23, as set forth in the Office Action dated June 13, 2002.

Argument

The Supplemental Examiner's Answer essentially repeats the rejections set forth in the Office Action dated June 13, 2002. The Supplemental Examiner's Answer further asserts that the present application does not present any evidence of an unexpected result achieved relative to the prior art of record sufficient to rebut the *prima facie* case of obviousness. Appellants respectfully disagree for the reasons set forth below.

1. The Present Invention Achieves Unexpected Results

In response to the Board's request for the Examiner comments on the evidence of an unexpected result achieved by the claimed invention, the Examiner merely contends that the passage from Huynh et al. quoted in both the Appellants' Reply Brief and the Board's

Remand to the Examiner is taken out of context and that there are no unexpected results achieved by the claimed invention. Appellants respectfully disagree.

As noted above, Huynh et al. teaches the selection of acid and base concentrations in order to achieve the greatest buffer capacity at the desired buffer pH (see, e.g., Huynh et al. at col. 3, lines 9-12). Huynh et al. does not teach or suggest that the buffer can increase the polishing rate of the polishing composition relative to similar unbuffered polishing compositions. Indeed, Huynh et al. states that “the inclusion of the buffering material in the second slurry does not change the polishing rate to any noticeable degree. For instance, a typical unbuffered silica slurry polishes titanium at a rate of 730 Å per minute. The silica slurry when buffered with 2×10^{-3} M acetic acid and 1×10^{-3} potassium hydroxide, polishes titanium at a rate of about 745 Å per minute” (col. 4, lines 18-24). Thus, rather than merely teaching that the addition of the buffering material “does not diminish the polishing rate of the slurry,” Huynh et al. teaches that the addition of the buffer (e.g., acid and base) results in *neither a noticeable decrease nor a noticeable increase* in the polishing rate. While Huynh et al. may also teach, as the Examiner contends, that the polishing rate of the buffered polishing composition does not decrease upon the addition of small amounts of an acidic polishing composition, Huynh et al. clearly teaches that the addition of the buffer does not noticeably change the polishing rate exhibited by the polishing composition.

The present application (e.g., Examples 1 and 2), on the other hand, demonstrates that a polishing system comprising water, an oxidizing agent, about 0.04 M or higher phosphate ion or phosphonate ion, and an abrasive material is capable of polishing a memory disk at a rate that is dramatically greater than the rates achievable with similar polishing systems. In particular, the present application demonstrates that a polishing composition according to the invention polishes a memory disk at a rate that is nearly 2 or more times greater than the rate at which a similar polishing composition comprising neither an oxidizing agent nor 0.04 M or higher phosphate ion or phosphonate ion polishes the same substrate (see, e.g., Example 2). Thus, contrary to the express teachings of Huynh et al., the present application demonstrates that the particular combination recited in the appealed claims results in a dramatic increase in the rate at which the system polishes a memory disk relative to similar polishing systems. Furthermore, one of ordinary skill in the art at the time of invention, having read the cited references, would have found such an increase in the polishing rate both “surprising” and “unexpected,” especially in view of the disclosure of Huynh et al. See, e.g., *In re Soni*, 54 F.3d 746, 34 U.S.P.Q.2d 1684 (Fed. Cir. 1995) (holding that a patent applicant may rebut a *prima facie* case of obviousness by showing that the claimed invention exhibits some superior property or advantage that a person of ordinary skill in the art would have found surprising or unexpected).

Accordingly, even if the appealed claims are found to be *prima facie* obvious over the cited references, the present application sets forth evidence of unexpected results, which are sufficient to rebut any such *prima facie* case.

2. *The Pending Claims Are Not Prima Facie Obvious Over the Cited References*

While the present application sets forth evidence of the unexpected results achieved by the claimed invention, which are sufficient to rebut any *prima facie* case of obviousness based on the cited references, Appellants note that the Examiner has failed to properly establish that the appealed claims are *prima facie* obvious over the cited references, despite the additional comments set forth in the Supplemental Examiner's Answer. Therefore, the Examiner's obviousness rejections of the appealed claims should be reversed for this reason alone. Appellants discuss the Examiner's alleged *prima facie* obviousness case in detail below in view of the Supplemental Examiner's Answer.

In the Supplemental Examiner's Answer, the Examiner asserts that claims 1-14 and 17-23 are obvious over (a) Huynh et al. in view of James et al. or (b) James et al. in view of Huynh et al. The Supplemental Examiner's Answer also asserts that claims 15 and 16 are obvious over the combination of Huynh et al. and James et al. in further view of Ishitobi et al. However, the Examiner has failed to identify any motivation to combine the cited references in the manner suggested, demonstrate that the suggested combination possesses all of the elements of the appealed claims, and demonstrate that one of ordinary skill in the art would have reasonably expected the proposed combination to succeed. Appellants discuss each of these deficiencies below.

A. *Lack of Motivation to Combine Cited References*

Contrary to the Examiner's assertions, one of ordinary skill in the art would not be motivated to combine the teachings of James et al. and Huynh et al. without the benefit of improper hindsight. In particular, there is nothing in Huynh et al. that points to its combination with James et al. Similarly, there is nothing in James et al. that points to its combination with Huynh et al.

In an effort to identify a motivation to combine a polishing composition of Huynh et al. with a method of polishing a memory disk disclosed in James et al., the Supplemental Examiner's Answer points to the disclosure in Huynh et al. that the polishing composition disclosed therein can be used in polishing a semiconductor substrate and "can also be used for other substrates" (Huynh et al. at col. 1, lines 8-10), but acknowledges that Huynh et al. does not disclose polishing a memory disk.

Since Huynh et al. fails to teach or suggest that the polishing composition disclosed therein can be used to polish a memory disk, one must look to James et al. for evidence of a motivation to combine the disclosures of the two references. In this regard, the Supplemental Examiner's Answer alleges that James et al. teaches a fixed abrasive polishing system used to planarize substrates including memory disks and semiconductor device substrates. The Supplemental Examiner's Answer further asserts that James et al. teaches that it is known in the art "to apply CMP polishing system[s] in applications for either a memory disk or a semiconductor device" (Supplemental Examiner's Answer, page 3, lines 10-12). However, the disclosure of James et al., when taken as a whole, cannot be considered to provide the motivation attributed to it in the Supplemental Examiner's Answer.

Initially, it should be noted that the section of James et al. relied upon in the Supplemental Examiner's Answer (i.e., col. 1, lines 34-47) refers to the alleged suitability of the *particular* polishing system disclosed in James et al. for polishing both semiconductor devices and memory disks. Thus, James et al. does not generally teach that *all* polishing compositions or systems which are suitable for polishing semiconductor substrates are also suitable for polishing memory disks. Indeed, as previously noted by Appellants, the art has recognized the distinction between microelectronics and memory disks (see, e.g., *ISEE Standard Dictionary of Electrical and Electronics Terms*, 4th Ed. 1988 at pages 553 and 588, presented in response to the Office Action dated September 25, 2001). Moreover, James et al. is directed to a CMP system primarily consisting of a fixed abrasive polishing pad. The details of the polishing fluid to be used therewith are very broad, allowing for the fact that different types of substrates may be used in conjunction with the polishing pad and that these different substrates will require different polishing compositions, i.e., different components in the polishing fluid. Thus, the alleged suitability of the polishing system described in James et al. for polishing both semiconductor devices and memory disks is due to the properties of that particular polishing system, not the properties of polishing systems in general.

The Supplemental Examiner's Answer further asserts that one of ordinary skill in the art would have been motivated to combine Huynh et al. and James et al. "since the invention of Huynh et al. utilizes slurries which are resistant to pH changes" (Supplemental Examiner's Answer, page 3, lines 13-17). As previously noted by Appellants, this statement seems to suggest that, since James et al. discloses the desirability of using a polishing fluid that provides a substantially consistent pH during polishing, and since Huynh et al. provides a slurry that is resistant to pH changes, there is motivation to combine these references. However, there is nothing in James et al. which points to the selection of the polishing composition of Huynh et al. over that of any other reference similarly disclosing a polishing composition comprising a pH modifier, pH buffer, or other means of maintaining consistent

pH. The Examiner has failed to provide any explanation for the propriety of selecting Huynh et al. from among many possible references, several of which relate specifically to memory disk substrates. Absent sufficient evidence of such a motivation to combine the particular references relied upon by the Examiner to support the obviousness rejection, the Examiner cannot be considered to have presented a *prima facie* case of obviousness.

B. Result of Combination Is Not Present Invention

Even if there was motivation to combine the disclosures of Huynh et al. and James et al., which there is not, the combination does not necessarily result in all of the elements of the claimed invention. In order to arrive at the claimed invention based on the combination of Huynh et al. and James et al., one of ordinary skill in the art would have to decide on polishing a memory disk with a polishing composition and then select a phosphate compound from among the list of possible choices to serve as a buffer component and utilize an amount of that phosphate compound of about 0.04 M or higher. However, neither Huynh et al. nor James et al. directs one of ordinary skill in the art to polish a memory disk using a polishing system that comprises a phosphate or phosphonate ion concentration of about 0.04 M or higher, as recited in the appealed claims.

As explained in Appellants' Appeal Brief, Huynh et al. provides too many choices and no teaching or suggestion to make the choices necessary to arrive at the present invention. In particular, Huynh et al. discloses a laundry list of buffer components, only a few of which contain phosphate ions, and none of which are phosphonate ions. Nothing in Huynh et al. or James et al. provides any motivation to choose a phosphate ion-containing buffer component over the other disclosed buffer components that do not contain phosphate ions. In fact, Huynh et al. teaches against the selection of a phosphate ion by disclosing that the combination of acetic acid and ammonium hydroxide (col. 3, lines 29-32) is the preferred acid/base combination with respect to silica-containing polishing compositions. Thus, to the extent that Huynh et al. and James et al. provide any guidance in this respect, they teach away from the subject matter of the appealed claims.

Moreover, to the extent that Huynh et al. discloses concentrations for the acid or base present in the buffer, Huynh et al. teaches a broad concentration range covering 7 orders of magnitude, along with a narrower range of 10^{-3} M to 10^{-2} M. The concentration ranges encompass the entire spectrum of acid and base compounds disclosed in Huynh et al. Further, Huynh et al. teaches that the acid and base compounds, which have a wide range of pK_a values (i.e., from 2 to 11), can be combined in varying amounts to produce buffer solutions having a wide range of pH values (i.e., about 3 to less than 11 (col. 2, lines 21-22)). However, neither Huynh et al. nor James et al. provides any teaching or suggestion that

would lead one of ordinary skill in the art to use a sufficient amount of a compound to yield 0.04 M or higher phosphate ion. Indeed, to the extent that Huynh et al. provides any motivation to modify the disclosed polishing composition, one of ordinary skill in the art would have been motivated to select acid and base concentrations in order to achieve the greatest buffer capacity at the desired buffer pH (see, e.g., Huynh et al. at col. 3, lines 9-12). Huynh et al. would not, contrary to the Examiner's assertions, motivate one of ordinary skill in the art to adjust the acid and base concentrations in order to increase the polishing removal rate with respect to the polishing of a substrate, such as a memory disk (as taught in the present patent application).

Absent a teaching or suggestion to make the proper choices, one of ordinary skill in the art would not have necessarily arrived at the claimed invention based on the combined disclosures of Huynh et al. and James et al. without the benefit of hindsight knowledge of the present invention.

C. No Reasonable Expectation of Success


The Examiner also has failed to demonstrate that one of ordinary skill in the art at the time of invention would have reasonably expected the proposed combination to succeed. Indeed, the Supplemental Examiner's Answer does not even address the issue of a reasonable expectation of success, much less provide a rationale as to why one of ordinary skill in the art would have reasonably expected the combination proposed in the Office Action to succeed. Moreover, as previously noted, the Examiner's Answer merely urges that there would have been a reasonable expectation of success because "phosphates are listed and the range of the amount used ... is also met by the disclosure of the range" and that "discovering optimum or workable ranges involves only routine skill in the art" (Examiner's Answer, page 5, lines 15-20). These statements, however, do not serve to confirm that one of ordinary skill in the art would have had a reasonable expectation that a polishing composition with greater than about 0.04 M phosphate or phosphonate ion would be useful in polishing a memory disk substrate. Huynh et al. and Jones et al. disclose a wide variety of components for the compositions and a wide variety of substrates to be polished with the resulting compositions. At most, it might have been obvious to try the particular combination of components to form a composition that is then used to polish a memory disk, as recited in the appealed claims, but an obvious to try rationale is insufficient to support an obviousness rejection under Section 103.

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Conclusion

For the foregoing reasons, as well as those set out in Appellants' Appeal Brief and Reply Brief, Appellants respectfully urge that the Examiner's rejections be reversed.

Respectfully submitted,



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